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Short report

Accessory nerve palsy

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SUMMARY After apparently uncomplicated excision of benign lesions in the posterior cervical triangle, two patients had shoulder pain. In one, neck pain and trapezius weakness were not prominent until one month after surgery. Inability to elevate the arm above the horizontal without externally rotating it, and prominent scapular displacement on arm abduction, but not on forward pushing movements, highlighted the trapezius dysfunction and differentiated it from serratus anterior weakness. Spinal accessory nerve lesions should be considered when minor surgical procedures, lymphadenitis, minor trauma, or tumours involve the posterior triangle of the neck.

Some clinical disorders of the accessory nerve are well described in standard texts (Haymaker and Woodhall, 1963; DeJong, 1967; Warwick and Williams, 1973; Baker, 1975) and case reports (Handord, 1933; Norden, 1956), but are still misdiagnosed with inordinate frequency. Within a few months, we saw two patients who were referred for evaluation of slowly progressive painful 'shoulder girdle' weakness and wasting thought to be a generalised neuromuscular disorder. Both had incurred traumatic lesions of the spinal accessory nerve during surgical procedures.

Case 1

A 62 year old lawyer noted a soft, painless mass in the apex of the posterior triangle of the neck for 10 years. The mass was removed under local anaesthesia and proved to be a lipoma. The operation and recovery period were apparently uncomplicated. One week after surgery, he had difficulty lifting the left arm to take off clothing, and the shoulder seemed to protrude. Pain in the neck and shoulder was aggravated by raising the arm and relieved by resting the arm on his hip. Despite the pain and weakness he was able to swim during the summer. There were no paraesthesias, weakness of hand or forearm muscles, neck pain, or sphincter symptoms. There was no relevant previous medical history, and no family history of neuromuscular disease.

Six months after surgery, general physical examination was normal. No neck mass was palpable; the operative scar had healed. There was slight wasting of the trapezius and the left supraclavicular fossa appeared deeper than the right. With arms dependent, the left elbow protruded more laterally than the right (Fig. 1), and there was slight winging and lateral displacement of the left scapula; this was more pronounced when the arm was abducted to shoulder level and, when this was done, the medial border of the left scapula rotated much further laterally than the right. Elevation of the left shoulder against resistance was good but backward movement against resistance was impaired. Starting with palms against his thighs he could abduct the right arm overhead without rotating the palm. On the left, he could do this but had to work harder, and the arm tended to twist so that the palm faced forward. Other scapular muscles were strong. No fasciculations were seen, but the direct response to percussion was more vigorous in the left trapezius than the right. Neurological examination was otherwise normal.

Results of urinalysis, haemogram, and blood chemistry were normal, as were radiographs of the skull base, cervical spine, chest, left shoulder, and left lung apex. Maximum motor nerve conduction velocities of the left ulnar and median nerves were normal at 57.9 and 56.6 m/s. Distal sensory latency of the left median nerve was nor-

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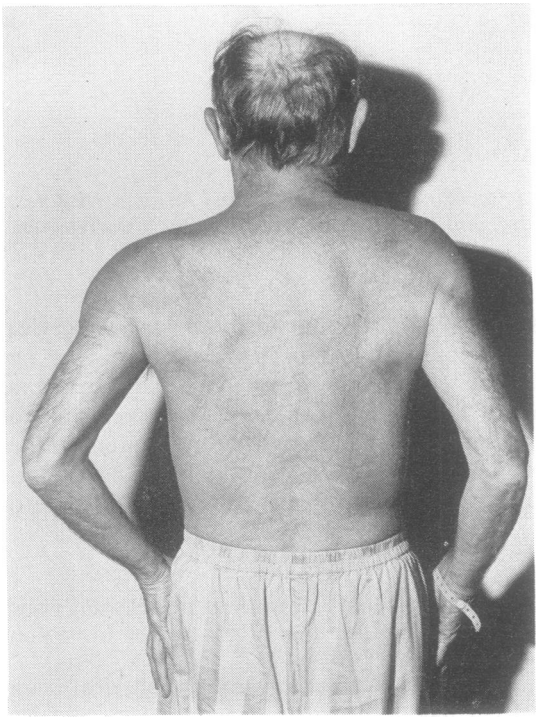

Fig. 1 *Arms dependent, posterior view: wasting of left trapezius and lateral protusion of left elbow are visible.*

mal at 3.2 ms but prolonged at 3.3 ms in the left ulnar nerve. Latencies of the accessory nerves were not determined. Monopolar needle electromyography of the left trapezius muscle showed positive waves and fibrillations. Motor unit potentials under voluntary control were reduced in number, of increased duration and amplitude, and complex and polyphasic. Other muscles tested, including supraspinatus, infraspinatus, rhomboid, serratus anterior, biceps, and triceps were normal.

Case 2

At age 41 years, this woman noticed a painless mass in the right posterior triangle of her neck. This was removed at another medical centre and was reported to be lymphadenitis. The operation was apparently uneventful. Three weeks later, the right clavicle seemed unusually prominent, and the right arm and shoulder began to hurt. The pain was not present on awakening but appeared and became more severe as the day went on. It was not related to posture or physical activity, and could not be relieved by change of position. She had no weakness, paraesthesias, or neck pain. There was no relevant medical or family history.

At age 44 years, the right clavicle was more prominent and the right shoulder lower than the left. There was winging of the right scapula, which was more pronounced with arms dependent and disappeared when the arms were raised to the forward horizontal position (normal serratus anterior function). With arms dependent, the right scapula was further from the midline than the left, and the upper border was rotated laterally. The sternocleidomastoid was normal, and trapezius function in raising the shoulder against resistance was good. When she tried to abduct the arms from the dependent position without twisting them (so that the hand would reverse from touching the thigh to facing outward above the head), she could do it normally on the left, but was unable to raise the arm above shoulder level on the right. There was no weakness of any other arm muscle, and the remainder of the neurological examination was normal.

Results of urinalysis, haemogram, blood chemistry, and radiographs of skull, chest, and cervical spine were normal. Motor nerve conduction velocity of the right median nerve was normal at 56.5 m/s with normal distal motor and sensory latencies of 3.3 and 3.4 ms. Motor nerve conduction velocity of the right ulnar nerve was slightly slow at 44.7 m/s with slightly prolonged distal motor and sensory latencies of 4 and 3.2 ms respectively. Monopolar needle electromyography showed fibrillations and postive waves in right supraspinatus and trapezius muscles. Reduced numbers of motor unit potentials under voluntary control were found in these two muscles. All other muscles tested of the right upper extremity were normal except for a few complex potentials in the hypothenar muscles. Measurement of spinal accessory nerve latencies was attempted in three healthy control subjects and both patients, but we could not obtain consistent results with Cherington's technique (Cherington, 1968).

Comment

The spinal accessory nerve leaves the jugular foramen and passes laterally and backwards, either posterior or anterior to the internal jugular vein, then descends obliquely to reach the upper part of the sternocleidomastoid muscle (Warwick and Williams, 1973). It pierces the deep surface of that muscle, supplies it, joins with branches from the C2 spinal nerve, and then runs along the deep surface of that muscle to emerge at the posterior border of the sternocleidomastoid,

just above the midpoint. The nerve then crosses the posterior triangle of the neck, lying on the levator scapulae, and there is in a superficial and vulnerable position adjacent to superficial cervical lymph nodes and receiving communications from C2 and C3 spinal nerves (Fig. 2). About 50 mm above the clavicle, the accessory nerve descends beneath the anterior border of the trapezius together with branches of C3 and C4 spinal nerves (which cross the posterior triangle obliquely at a lower level than the accessory nerve) and a plexus is formed on the deep surface, from which the trapezius is innervated.

Although the majority opinion is that the upper portion of the trapezius is innervated solely through the accessory nerve and that the lower portion is usually supplied by the lateral series of the deep branches of the third and fourth cervical nerves (Brodal, 1969), variations are not infrequent and at least one author (Anderson and Flowers, 1969) believes that the contribution from C3 and C4 spinal nerves is purely proprioceptive. Fibres of the upper trapezius elevate the scapula, draw it forward, and, therefore, raise the point of the shoulder and allow the arm to be raised above the head. Fibres of the lower trapezius act with the rhomboids to retract the scapula and brace back the shoulder.

The causes of injury to the accessory nerve have been described often. Wulff (1941) cited several cases due to compression by lymphomatous nodes. Kramer (cited by Norden, 1956) described isolated lesions due to gunshot wounds in World War I. The nerve may be damaged by inflammatory or neoplastic lesions at the base of the skull or within the neck (Ballantyne and Guinn, 1966), by minor surgical incisions in the posterior triangle of the neck (Handord, 1933), major neck surgery (Ballantyne and Guinn, 1966), or even without overt cause (Eisen and Bertrand, 1972). Accessory nerve paralysis has also been described after hemithyroidectomy (Schneck, 1960).

Accessory nerve palsy must be differentiated from the similar syndrome due to weakness of the serratus anterior after lesions of the long thoracic nerve (Eisen and Bertrand, 1972). In both conditions there is difficulty in raising the arm fully above the horizontal (Table). In serratus anterior palsy, the initial pain usually involves the shoulder region, and deformity at rest is minimal. Winging of the scapula is prominent on forward elevation

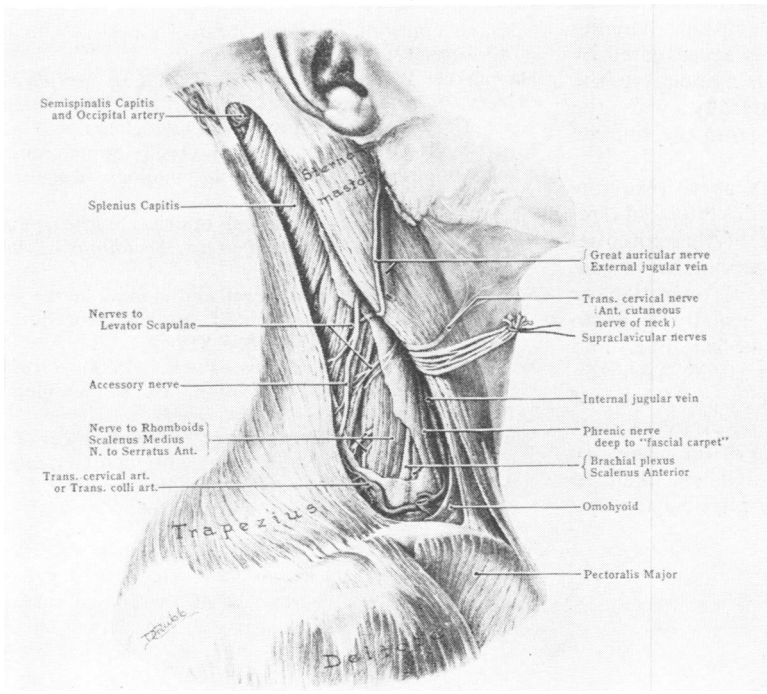

Fig. 2 *Extracranial course of right accessory nerve.*

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Table *Differential diagnosis of spinal accessory (XI) and long thoracic nerve (LTN) lesions*

	XI	*LTN*
Pain	usually severe involving supraclavicular fossa, suboccipital region and shoulder	usually minimal localised to scapular region
Winging at rest	minimal	more marked
Winging during activity	accentuated by forward elevation and pushing with outstretched arm	accentuated by arm abduction at shoulder level
Deformity at rest	trapezius wasting, supraclavicular fossa appears deeper on affected side	minimal especially on frontal view
Elbow at rest	protrudes laterally	minimal lateral protrusion
Elbow adduction	impaired on affected side	not impaired
Scapular displacement	superior angle further from midline	inferior angle further from midline
Muscles involved	trapezius, sternocleidomastoid (sometimes)	serratus anterior

of the arm. The scapula moves upward and laterally, with the inferior angle displaced further from the midline than the superior angle. In contrast, pain associated with trapezius paralysis is located along the posterior border of the sternocleidomastoid and in the suboccipital region. The shoulder droops, there is internal rotation of the scapula and loss of the trapezius contour. Winging of the scapula is moderate and is accentuated by abduction of the arm. During this manoeuvre, the scapula moves upward and laterally, with the superior angle displaced further from the midline than the inferior angle.

Lesions of the spinal accessory nerve (Morrow and Broder, 1965) seem to be overlooked frequently. If the surgeon is aware of this potential complication, and if the nerve cannot be spared, free nerve grafting at the time of operation or within the next several weeks, usually leads to moderate or complete elimination of disability and discomfort (Ballantyne and Guinn, 1966; Anderson and Flowers, 1969). Unfortunately, in the case of an older injury, as in the present cases, nerve graft or suture (if the peripheral stump of the accessory nerve can be found at all) is much less likely to succeed, and one must resort to physical therapy and other symptomatic treatment, which are not usually very helpful. Alleviation of pain is usually the primary goal and wearing an arm sling sometimes relieves the discomfort.

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